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The Moho depth map of the South China Sea based on gravity data inversion

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The South China Sea (SCS) has complex tectonic evolution history and its crustal structure is one key point to understanding the properties of the sea basin and the continental margins. For decades of geophysical investigations, more seismic profiles have been done for the crustal structure study in the north and south margin of SCS. Comparing with the seismic methods, the gravity data has full coverage of the sea, and can be used to study the crustal structure in the whole SCS.

The satellite gravity data is used to study the Moho depth of the SCS. The complete Bouguer correction is applied to eliminate the effects of fast varied bathymetry. The effects of inner crust density variations are studied from the results of spectrum analysis, band-pass filtering, wavelet analysis etc. To remove the gravity effects of inner crustal density variations, we did gravity forward computation using the seismic survey results and compared the above gravity data processing results. The regional gravity field mainly caused by the density variations across the Moho is obtained for inversion. The Moho depths from the ocean bottom seismic (OBS) data were used as constraint points during the inversion.

The inversion results show that the Moho depth of the SCS varies from 8∼32km. The Moho depth is about 26∼30km at the north continental margin and 22∼28km at the south continental margin, about 8∼10km at the central sea basin, 20∼26km at Xisha island and Zhongsha island. The continual crust, oceanic crust and the transition zone are delineated based on the crust thickness, gravity anomaly character and former seismic studies. The Moho depth map provides basic crustal structure features for further tectonic analysis.